

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20031019		FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2004/000136	International filing date (day/month/year) 11.03.2004	Priority date (day/month/year) 19.03.2003	
International Patent Classification (IPC) or national classification and IPC B01D11/04, C22B3/02//C22B15:00, C22B19:00, C22B23:00, C22B34:34, C22B60:02			
Applicant Outokumpu Oyj et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
- a. ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
- ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
- ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
- b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 12.01.2005	Date of completion of this report 06.04.2005
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2004/000136

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2004/000136

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-38</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-38</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-38</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The invention

This application pertains to a method and equipment for liquid-liquid extraction.

The recovery of metals often requires many mixing-separation units or mixer-settlers. This kind of arrangement is disadvantageous. Another drawback when extracting metals is that the separation capacity of the settler remains incomplete and the entrainment of residual droplets in the separated solution is high.

The present invention is intended to overcome these deficiencies.

The aim is met by controlled separation of dispersion. The dispersion in the separation section is conducted into an outward flow field. The field is formed by partition walls. The phases that have separated flow longitudinally. The dispersion remaining in the middle of the separated phases is dammed up with one reversing element, placed in the rear part of the outward flow field, extending from one partition wall of the separation section to the other. After the reversing element, the direction of the dispersion and the direction of the separated solution phases are reversed in the rear of the separation section in the opposite direction to flow back in return flow fields situated on both sides of the outward flow field towards the feed end of the separation section.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

Cited document

This document is cited in the International Search Report. The citation is considered to describe the most relevant prior art:

D1) US-A1-3 997 445

An apparatus for counter-current extraction of a dissolved material from a first liquid phase to a second liquid phase is previously known from D1. The extraction is carried out according to the so-called "mixer-settler" principle (column 1, lines 4-9). One problem with extraction according to this document is that some of the other materials dissolved in the first liquid will usually have some affinity for the second liquid (column 1, lines 23-25). The apparatus comprises a mixing chamber (16) and a settling chamber (32). Combined liquids pass further into an intermediate portion having porous cross walls (36) and (38). After the liquids separate in the intermediate portion of the settling chamber (32), they pass through one of the porous walls (38) to the remote end of the settling chamber (32) referenced by (40). The settling chamber remote end (40) is provided with partitions (42) and (44) to seal off selected portions of the settling chamber (fig. 1 & column 1, line 47-column 2, line 37). The mother liquor is continuously passing in one direction and the extractant liquid is continuously passing in counter-current flow (fig. 2 & column 2, lines 45-46). Fig. 2 also illustrates that the counter-current flow is situated on both sides of the outward flow.

Analysis

D1 is cited in the International Search Report as a document of particular relevance and is now considered to show the closest background art. The reason for this review is that the present invention describes one extraction step in which the dispersion and settled phases together flow first to the rear end and then back to the front end inside the same settling

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

section. Furthermore, the porous walls of D1 do not turn the flow of fluids vertically, but the liquids go right ahead through them in a horizontal direction. Consequently, D1 does not anticipate the technique of claim 1.

Since dependent claims 2,5,12 refer to claim 1, the opinions on these claims are also re-evaluated.

The method and equipment for separation of a dispersion according to the independent claims 1 and 13 are considered to give rise to an unexpected technical effect, i.e. regulating the thickness of the dispersion band and achieving controlled turning of the different phases in the rear of the settler. Thus, these claims are not considered to describe a technique that is obvious to a person skilled in the art.

Conclusion

In accordance with the arguments stated above, the invention in claims 1-38 is novel, considered to involve an inventive step and has industrial applicability.